6. The data storage system of claim 5, wherein the source data mover determines whether to send the file in chunks along with header information according to the file format.

REMARKS

In response to the examiner's objections to the drawings as failing to comply with 37CFR 1.84(p)(5), applicants, in the drawings or the specification deleted or amended reference numerals 90A, 90B, and 92 in Fig. 2B; 20 and 30 in Fig. 2C; 50D, 80D, 75, and 95 in Fig. 4A; 82 and 85 in Fig. 4B; 75 and 80 in Fig. 6; and 60A in Fig. 7. The applicants assert that these technical changes to the drawings and the specification resolve the examiner's objections without adding any new matter.

In the Office Action, the Examiner rejects claims 1-2 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,544,347 to Yanai et al. ("Yanai") in view of U.S. Patent No. 5,619,644 to Crockett et al. ("Crockett"), and in further view of U.S. Patent No. 5,887,134 to Ebrahim ("Ebrahim"). The applicants add claims 3-6 to more fully claim aspects of the present invention. For at least the reasons set forth below, the applicants respectfully assert that the pending claims are patentable over the prior art of record and request their allowance.

Crockett discusses a system for providing state saves between distributed components in a computer system. In Crockett, storage controllers generate data prefix headers which are used by data movers for grouping data. (Col. 7, lines 24-26; Col. 8, lines 30-40) Thus, control information, including data prefix headers, is maintained in the storage controllers, and the data movers, at predetermined times, read the data and

associated control information in preparation for remotely copying the data. (Col. 3, lines 44-49)

Ebrahim discusses a system for using memory mapped programmed input/output ("PIO") and direct memory access ("DMA") operations to pass messages between nodes of a computer network. The system processes PIO commands and DMA commands from one or more data processors at a node of a computer network. (Col. 7, lines 22-24) "PIO store" commands include a destination address and a chunk of data to be written to the destination address; "DMA store" commands include a starting destination address, a starting source address, and a data transfer length value indicating how much data to transfer. (Col. 7, lines 30-34)

Ebrahim discusses a data chunk as the amount of data that can be transferred over the network as a single atomic action from the viewpoint of the central processing unit ("CPU"). (Col. 2, lines 9-11) Command messages thus contain headers which are assumed to be no larger than the amount of data that can be stored in one CPU register. (Col. 13, lines 6-10) The network interface includes a packetizing engine which converts PIO and DMA instructions into packets. (Col. 21, lines 34-37) DMA instructions are not implemented using conventional DMA transfer logic, but rather are converted by the network interface logic into an equivalent sequence of data transfer packets that are indistinguishable from the packets generated by PIO instructions. (Col. 21, lines 39-48)

Claim 1 of the applicants sets forth a destination data mover and a source data mover, communicatively coupled to the at least one storage device. Additionally, claim 1 sets forth that the source data mover analyzes the file to determine whether to

send the file to the destination data mover in chunks. For example, in one embodiment described in the application, data in different file formats such as text format, streaming video format, and audio format, is separated into chunks which can be stored in different storage media in different formats. For example, a first chunk of data in text format could be stored uncompressed on an optical media device; a second chunk of data in streaming video format could be stored in compressed format in a tape library; and a third chunk of data in audio format could be stored in compressed format on a magnetic media storage device such as a redundant array of inexpensive disks. See applicants' specification page 27, lines 11-14.

Regarding the Examiner's rejection over Yanai, Crockett, and Ebrahim, the applicants respectfully disagree that the present invention as claimed in claim 1 is obvious in view of these patents. As explained further below, Yanai, Crockett, and Ebrahim do not disclose or together suggest a system including a destination data mover and a source data mover, communicatively coupled to the at least one storage device, that analyzes the file to determine whether to send the file to the destination data mover in chunks. There are a number of differences between the methods and systems as described and claimed in the present application and those of Yanai, Crockett, and Ibrahim, several of which are now discussed.

Regarding Ebrahim, the applicants respectfully disagree that Ebrahim even implicitly discloses analyzing a file to determine whether to send the file to the destination data mover in chunks. Indeed, in Ebrahim, files are not analyzed to determine whether to send them in chunks - all files are sent in chunks.

The file analysis that takes place in Ebrahim simply determines whether an instruction to be sent is a PIO instruction or a DMA instruction. Then, if the file is a PIO instruction it is sent as a single chunk, or if the file is a DMA instruction it is sent as multiple chunks by the packetizing engine. (Col. 21, lines 34-37) As discussed, data chunks in Ebrahim are based upon the maximum amount of data that can be sent over the network as one CPU instruction. The size of a data chunk in Ebrahim is therefore fixed and remains constant for all data sent at the size of one CPU instruction according to the system architecture. (Col. 2, lines 9-11)

By contrast, in the present application, data may not always be sent as chunks. The data mover analyzes the file to determine whether (or not) to send the file to the destination data mover in chunks. Among other advantages, chunking allows for variable handling of arbitrary pieces of data in one stream or archive - separating a data stream into data chunks permits different kinds of data to be processed differently. For example, a stream of data can be separated into data chunks according to file type for more convenient storage operations.

In addition, as the Examiner notes in the Office action, Yanai does not disclose or even suggest using a data mover. Further, Yanai also does not disclose or suggest analyzing a file to determine whether to send the file to a destination data mover in chunks.

In addition, as the Examiner notes in the Office Action, Crockett does not disclose or even suggest using a data mover to analyze a file to determine whether to send the file to a destination data mover in chunks. In Crockett, control information, including data prefix headers, is maintained in the storage controllers; data movers merely process

data prefix header directives generated by a storage controller regarding how the data mover should copy the data. (Col. 3, lines 44-49) Neither Yanai nor Crockett contain any suggestion or hint to use a technique which the examiner admits is at best only implicitly taught by Ebrahim. By contrast to the data movers in Crockett, the data mover in claim 1 analyzes the file to determine whether to chunk the data.

In addition, Yanai, Ebrahim, and Crockett do not disclose the elements in claim 2, including a destination data mover and a source data mover, communicatively coupled to at least one storage device that sends a file to the destination data mover in chunks along with header information instructing the destination data mover regarding the chunks. As previously discussed, neither Yanai nor Crockett contain any suggestion or hint to use a technique which the examiner admits is at best only implicitly taught by Ebrahim.

In addition, for at least the reasons set forth above, Yanai, Ebrahim, and Crockett do not disclose the elements in claim 3, including a data storage system comprising a destination data mover and a source data mover, communicatively coupled to the at least one storage device, for determining, according to characteristics of the file, whether to send the file to the destination data mover in chunks.

In addition, for at least the reasons set forth above, Yanai, Ebrahim, and Crockett do not disclose the elements in claim 5, including a data storage system comprising a destination data mover and a source data mover, communicatively coupled to the at least one storage device, that sends the file to the destination data mover in chunks, according to file characteristics, along with header information instructing the destination data mover regarding the chunks.

The dependent claims of the present application contain additional features that further substantially distinguish the invention of the present application over Yanai, Crockett, Ebrahim, and the other prior art of record. However, given the applicants' position on the patentability of the independent claims, it is not deemed necessary at this point to delineate such distinctions.

For at least all of the above reasons, applicants respectfully request that the examiner withdraw all rejections, and allowance of all the pending claims is respectfully solicited. To expedite prosecution of this application to allowance, the examiner is invited to call the applicants' undersigned representative to discuss any issues relating to this application.

Respectfully submitted,

Dated: May 5, 2003

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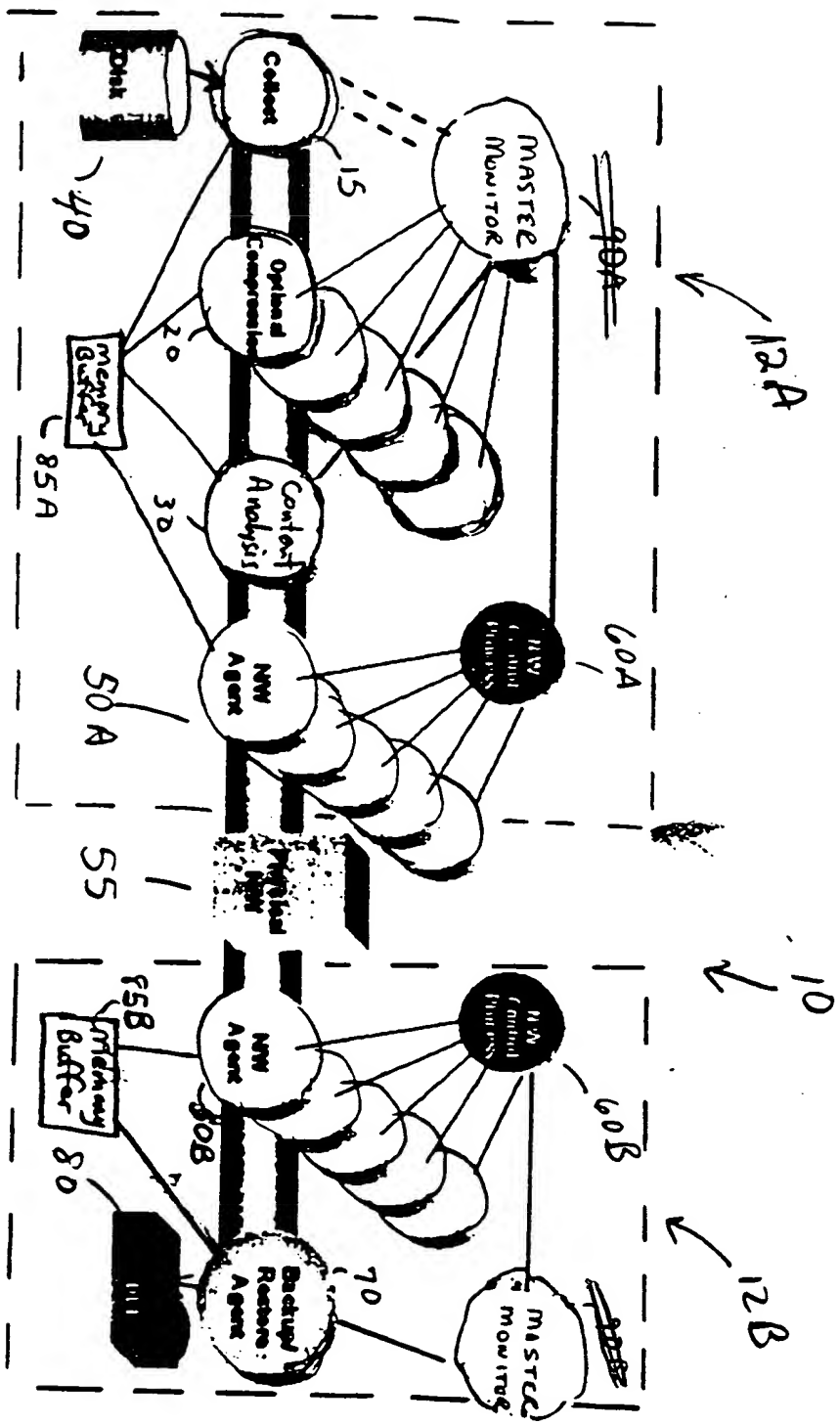

FIG. 2B

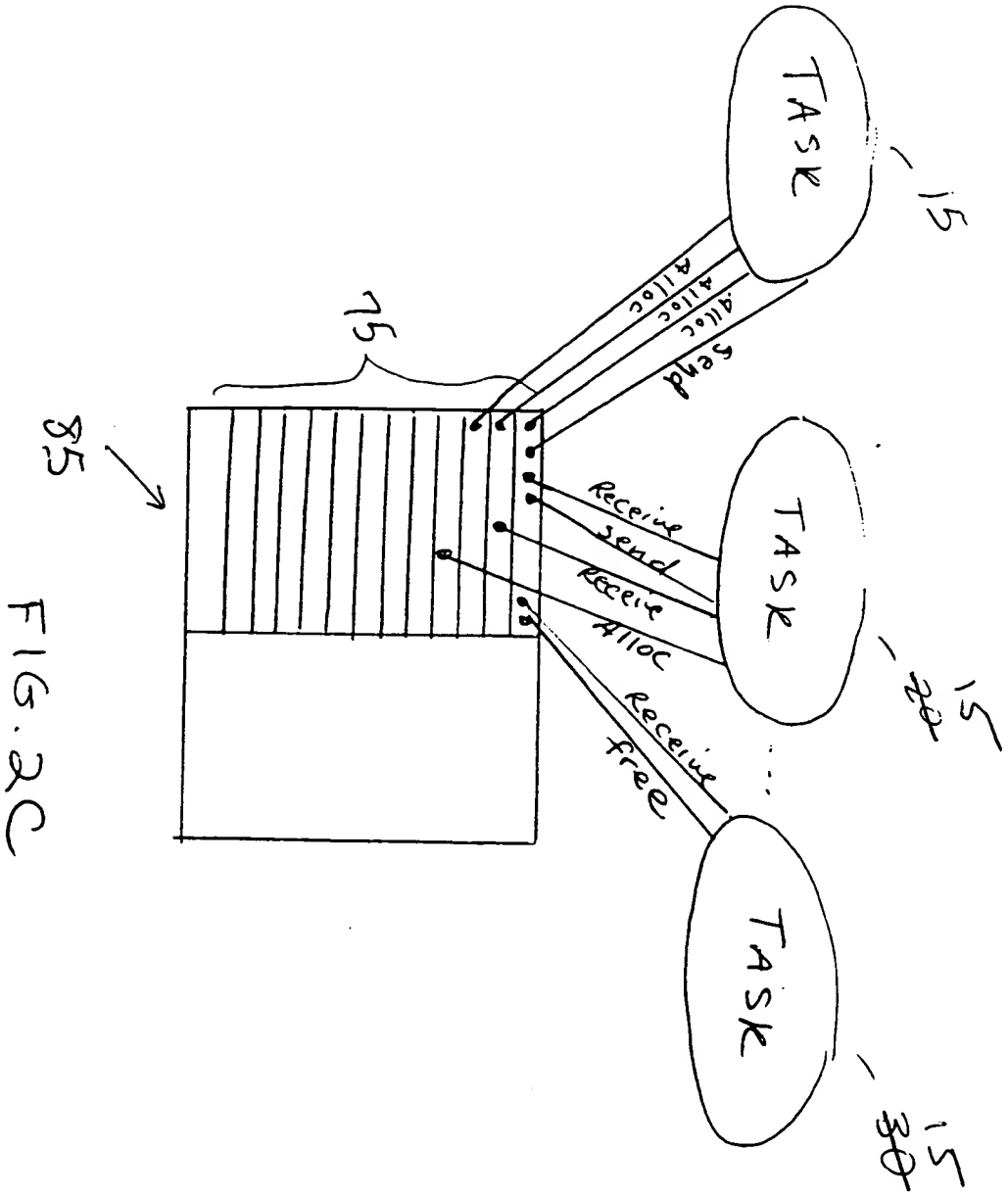

FIG. 2C

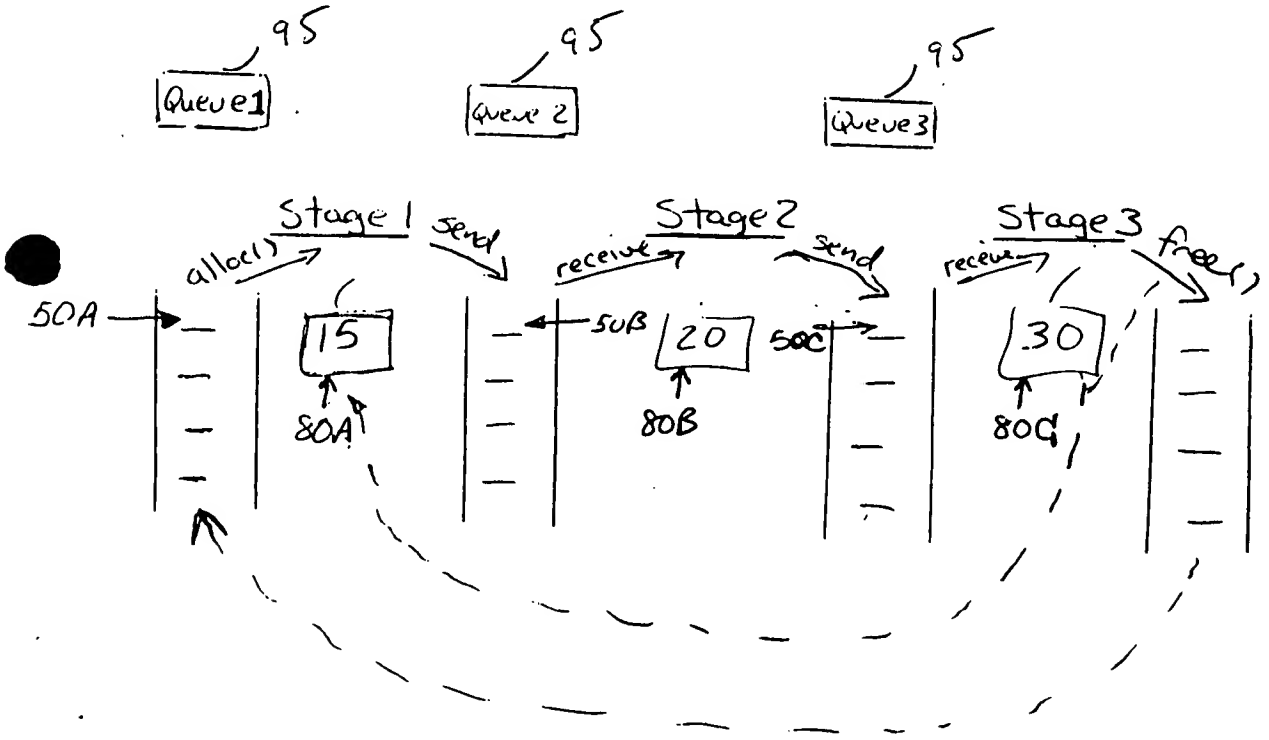

FIG. 4A

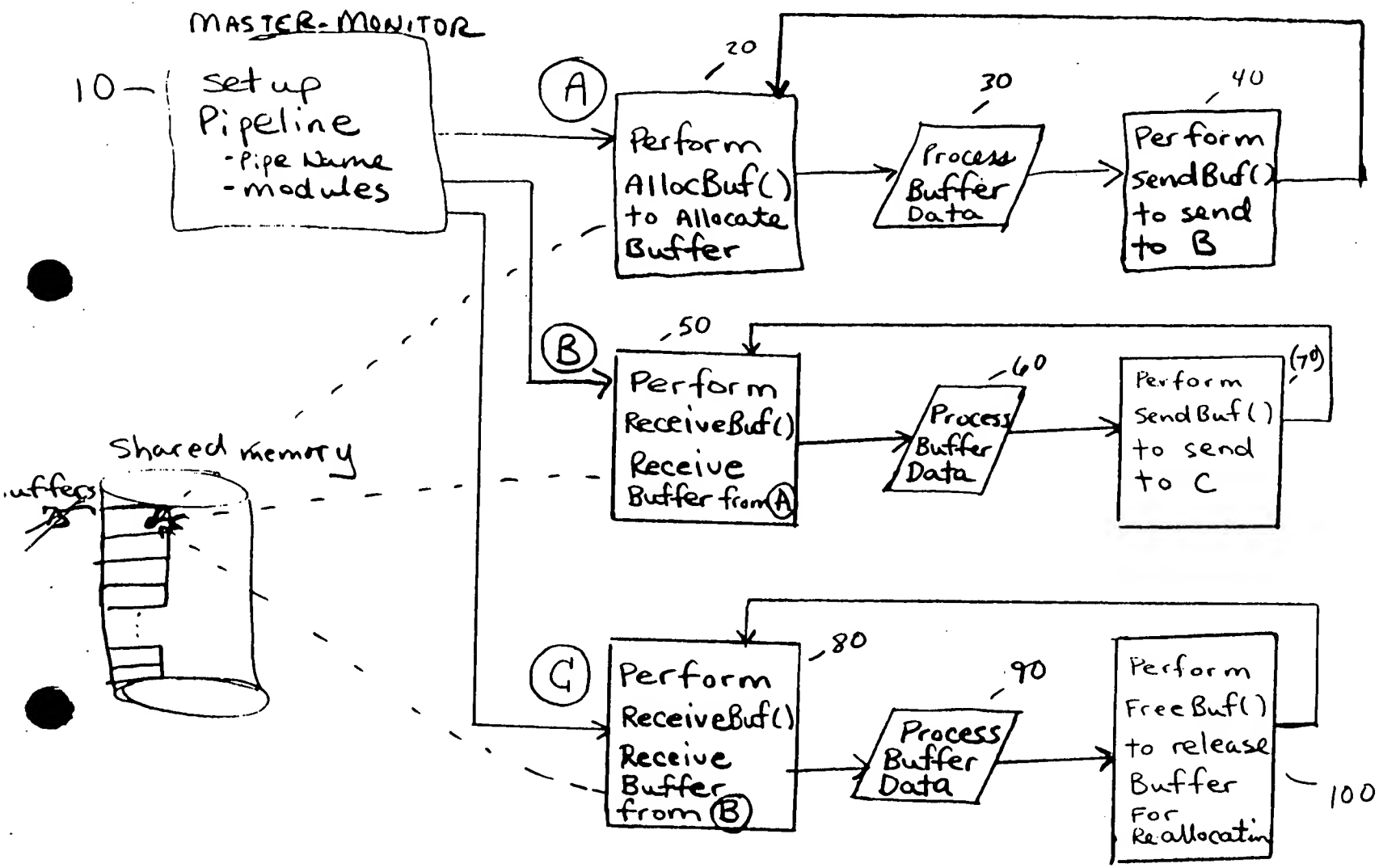

FIG. 6

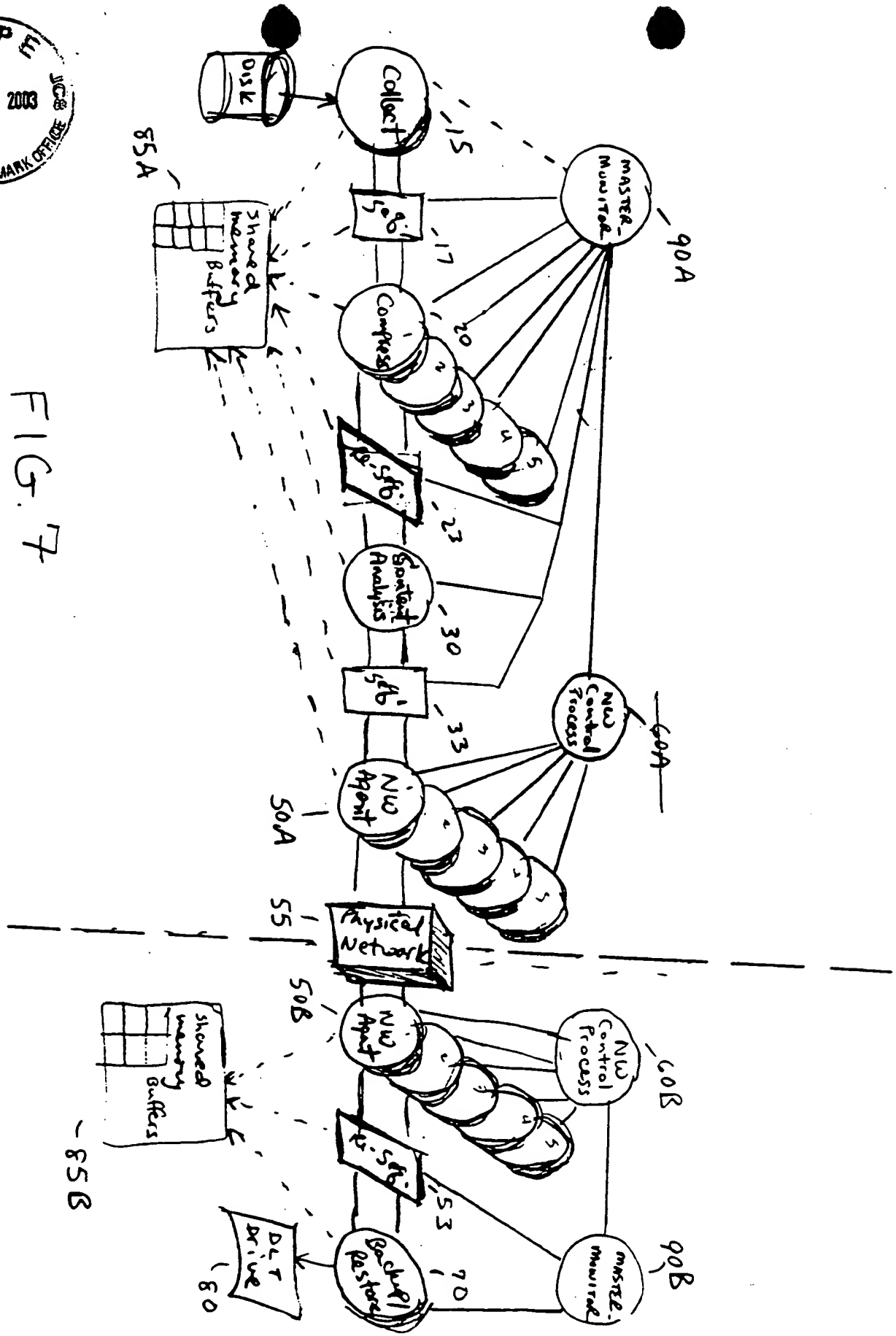

FIG. 7